Cold-water corals research in the lab and in the field: (1) growth rates of four CWC species maintained in aquaria, (2) new research areas: the Galicia Bank and the Avilés canyon (Atlantic and Cantabrian Sea), a scientific and methodological approach

Covadonga Orejas, Christine Ferrier-Pagès, Stephanie Reynaud, Andrea Gori, Georgios Tsounis, Denis Allemand, Josep Maria Gili, Francisco Sánchez, Alberto Serrano, César González-Pola, Manuel Ruiz, María Druet, María Gómez-Ballesteros

Growth rates of 4 CWC species from the Mediterranean

- Study of the growth rates of

Madrepora oculata
Lophelia pertusa
Desmophyllum cristagalli
Dendrophyllia cornigera

- Comparison between two different methods

- Comparison with tropical species

New research areas: Galicia Bank and Avilés canyon

- Study of new research areas in order to enlarge the Natura 2000 net and accomplish the compromise with Europe

- Base line research. Characterisation of the research areas

- Biological information. Mapping biological communities (epibenthos and demersal)

- Identification of vulnerable ecosystems and essential fish habitats

Growth rates of 4 CWC species from the Mediterranean

Studied species

Madrepora oculata

Lophelia pertusa

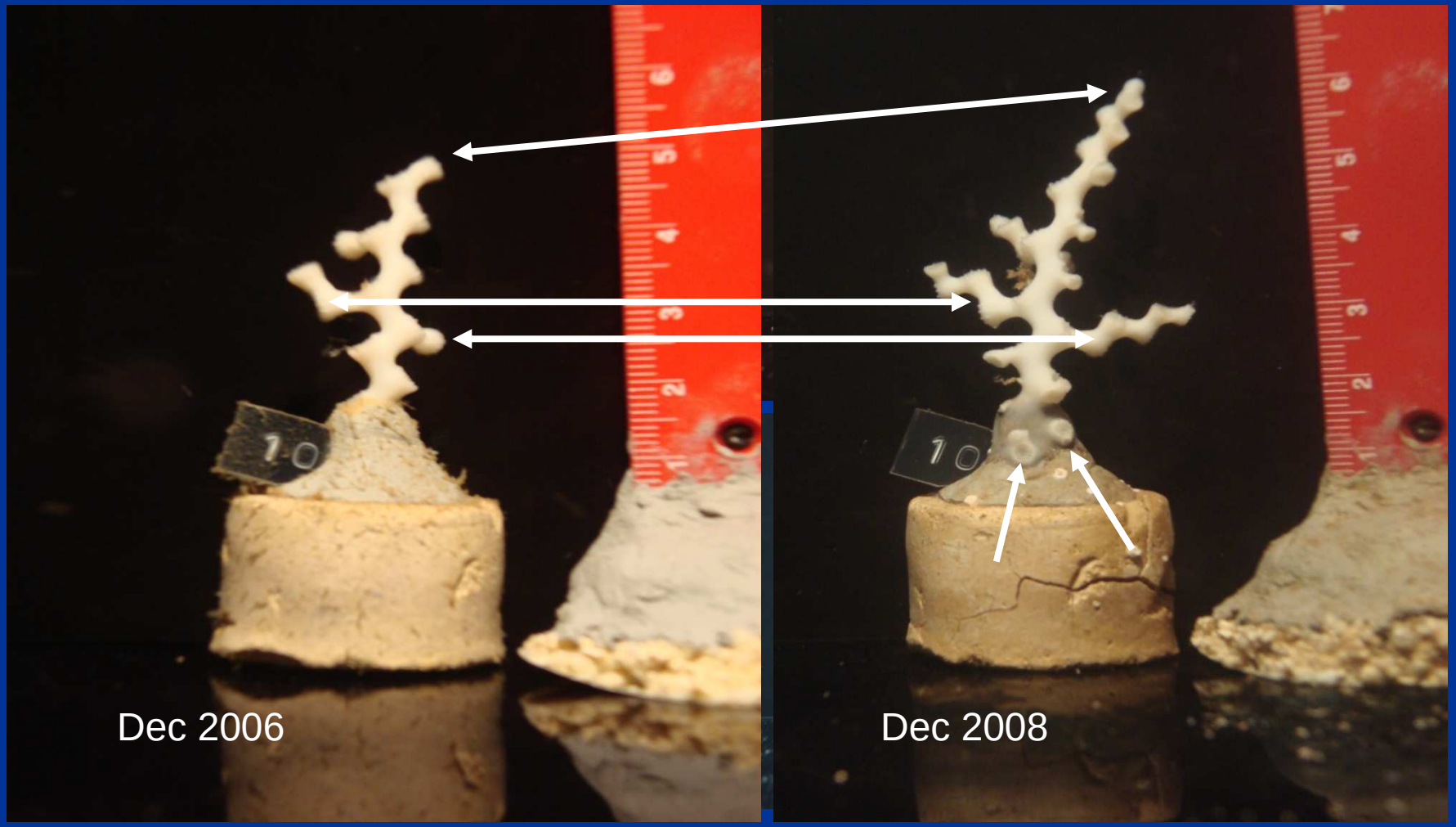
Desmophyllum cristagalli

Dendrophyllia cornigera

- NW and Central Mediterranean
- ~ 12ºC
- 200-300 m depth
- three branched species, one solitary
- aquaria (same conditions, water temperature, current regime, feeding)

Growth rates of 4 CWC species from the Mediterranean

Linear growth



Some conclusions

- *Madrepora oculata* had a significantly higher growth rate (buoyant weight) than the other 3 CWC species analysed
- *Madrepora oculata* had similar growth rates than the tropical coral *Galaxea fascicularis* in spite of high temperature difference and food regime (fed and in starvation!)

Why? …Still many question marks…

- Possible reasons for this "faster growth" of Madrepora….more "feeding effectivity", different energy allocation, different skeletal structure, better tolerance for the current environmental conditions in the Mediterranean Sea…
- Methodological discussion: need of real density values for the studied CWC species, need to take into account number and extension of polyps when using linear growth measurements, differences in food supply (type and frequency)

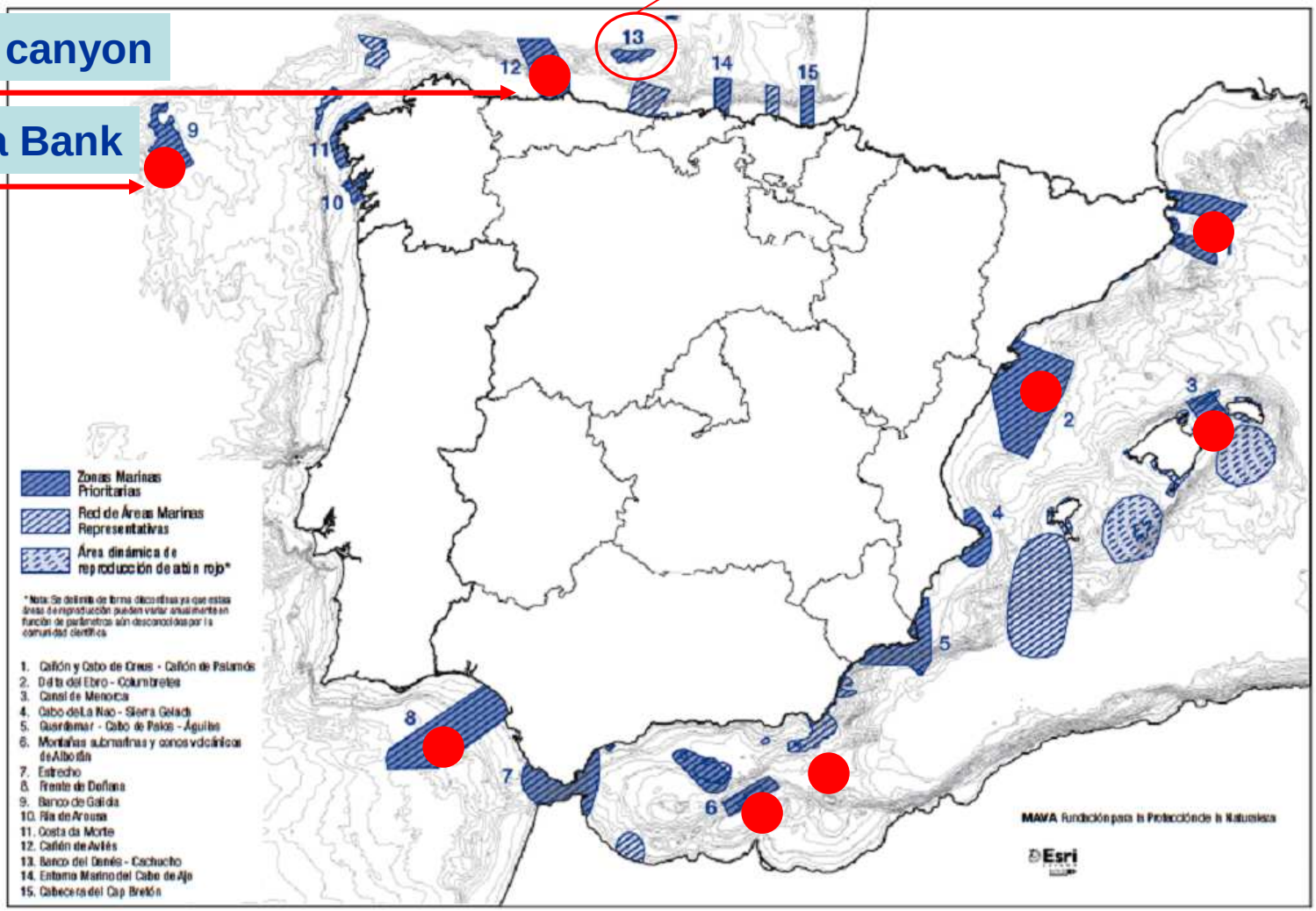
New research areas: Galicia Bank and Avilés canyon

INDEMARES (LIFE project 2009-2014)

MPA

Avilés canyon

Galicia Bank



+ ● South Fuerteventura and ● Banco de la Concepción

Source: WWF

INDEMARES

- Ecosystem approach

- Integrated study of the physical scenario (hydrography, geomorphology)

- Ecosystem compartments (fish, endo-, epi-, and suprabenthic and benthopelagic fauna)

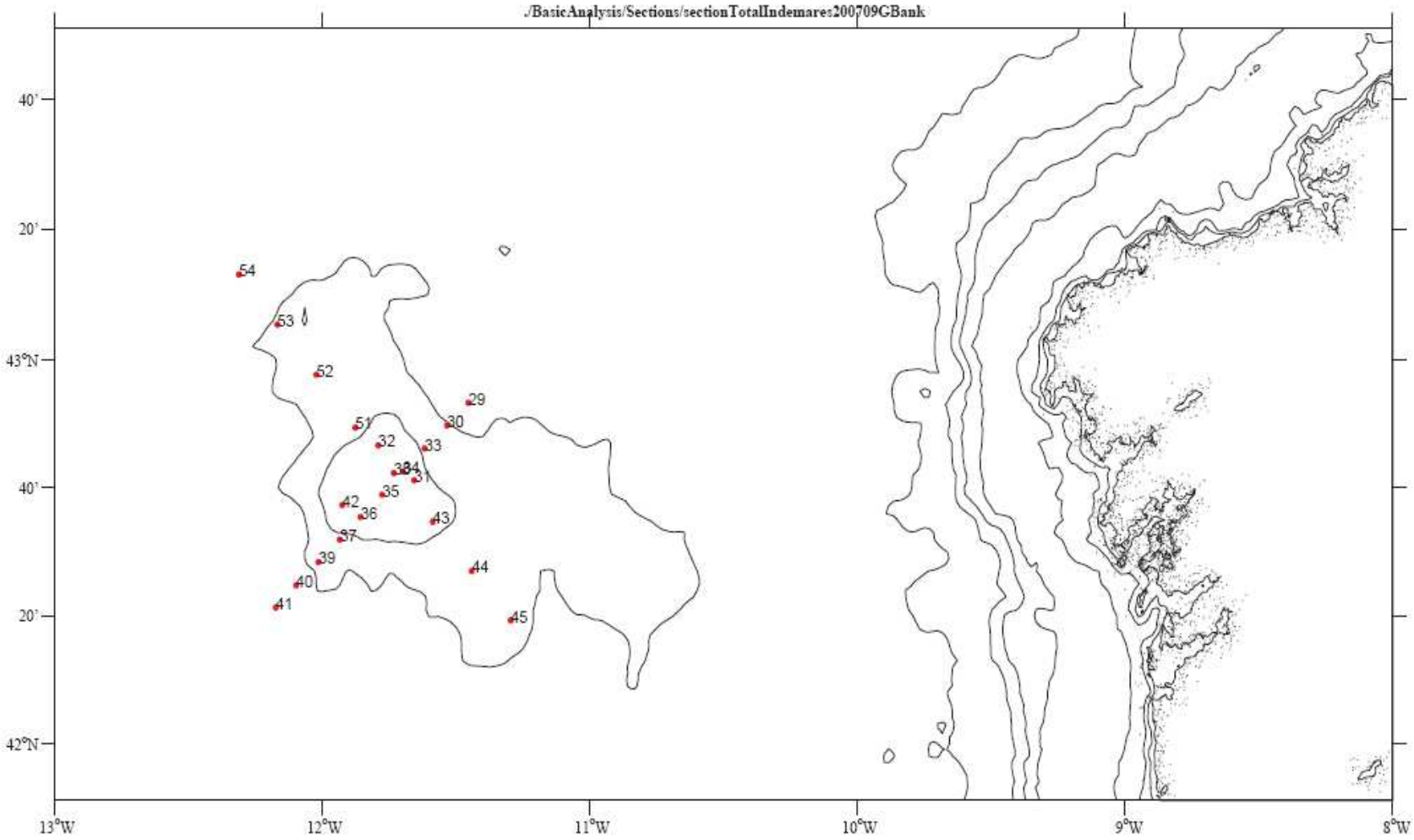
- Study of the impact of the fisheries working in the areas

Trophodynamic mass-balance model

Identification of vulnerable ecosystems (VE) (as the CWC habitats are)
and
Essential Fish Habitats (EFH)

Galicia Bank: abiotic data

Oceanographic data



Source: IEO (ECOMARG 2009)

Galicia Bank: benthic and demersal fauna. Previous data

From October 1998 to October 1999 (ICES Divisions IXb)

- The community of species in the area prospected presented high species richness.
  Total of 106 species

  70 teleosts (*H. mediterraneus, M.moro, L. eques, A. bairdii, E. telescopus, T. cristulata*, *L. piscatorius*)

  11 sharks (*D. licha, D. calceus*)

  3 rays

  2 chimaeras

  Invetebrates (11 crustacea, 6 molluscs and 3 equinoderms)

- Results indicated

  no differences in depth distribution of the species

  seasonal variation in the abundance of the most important caught

Piñeiro et al. 2001

Galicia Bank: benthic and demersal fauna. New data

Natura 2000

OSPAR

Environments

- Carbonate mounds
- Coral gardens
- Deep Sea sponges aggregations
- *Lophelia pertusa* "reefs"
- Seamounts
- Sea pens and burrowing fauna

Species

- Deep Sea sharks
  - *Centroscymnus coelolepis*
  - *Centrophorus granulosus*
  - *Centrophorus squamosus*
  - *Squalus acanthias*
- Rayas
  - *Dipturus batis*
  - *Raja clavata*
- Other fish /sharks species
  - *Hoplostethus atlanticus*
  - *Alosa alosa*
  - *Cetorhinus maximus*
  - *Thunnus thynnus*

Galicia Bank: anthropogenic activities

Previous informations

- Surveys IIM Vigo (CSIC)- Pérez-Gándaras (1981)

- Piñeiro CG, Casas M, Bañón R (2001) The deep-water fisheries exploited by Spanish fleets in the Northeast Atlantic: a review of the current status. Fish Res 51: 311-320

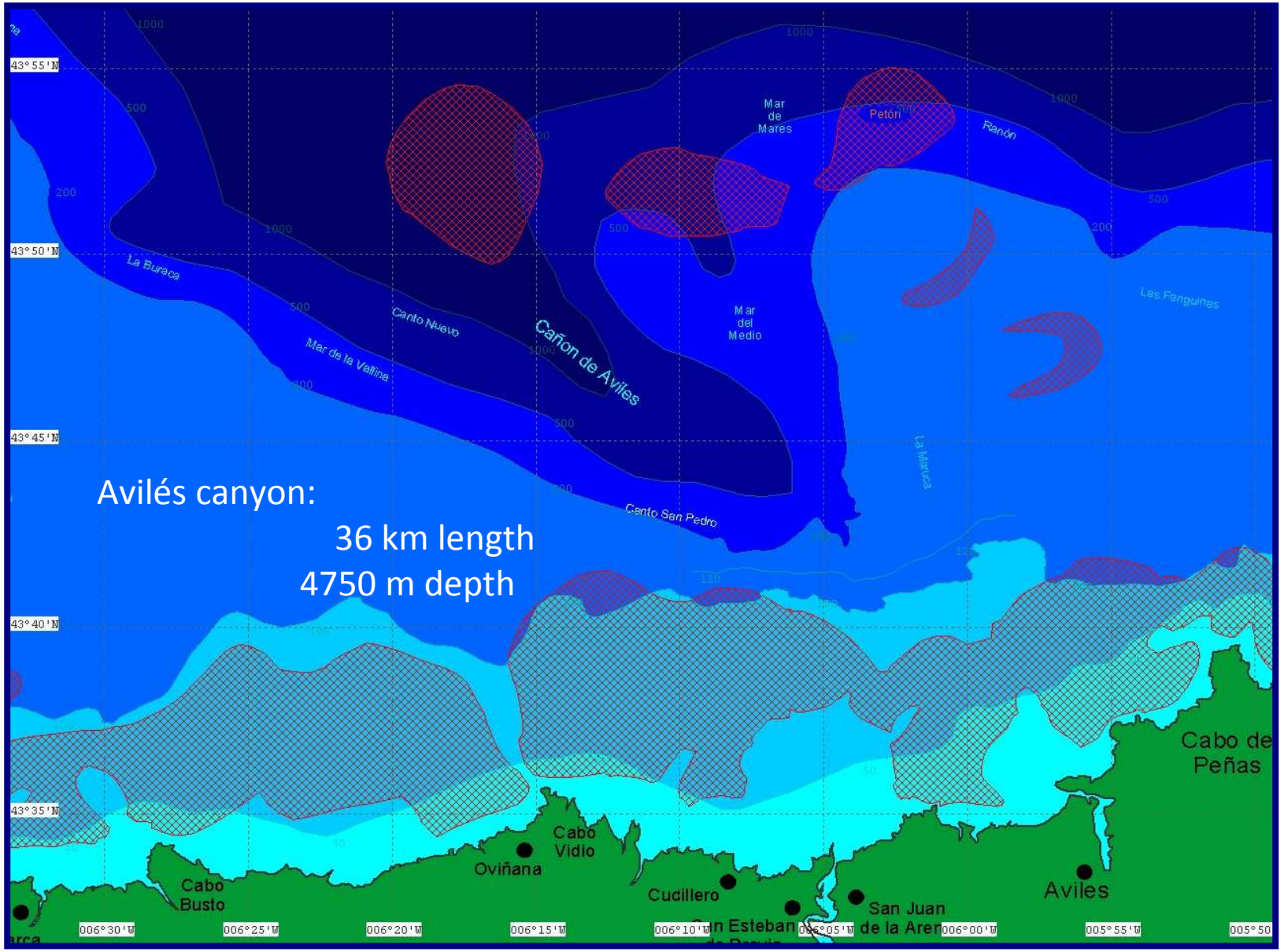
- *Chaceon affinis (*King crab*)* fisheries (from 1988 to 1997)

Nowadays

- Ocasional fisheries

- After log-books (2004) some *Brama brama* fisheries

Avilés canyon: abiotic data



Previous knowledge

- Good knowledge on pelagic communities (PELACUS anual cruises, since 1983)

- Long time series for demersal fauna (sedimentary seafloor and until 500 m depth) (DEMERSALES anual cruises, since 1983)

- Some previous information on the benthic communities (Louzao et al. 2010, project COCACE)

Avilés canyon: anthropogenic activities

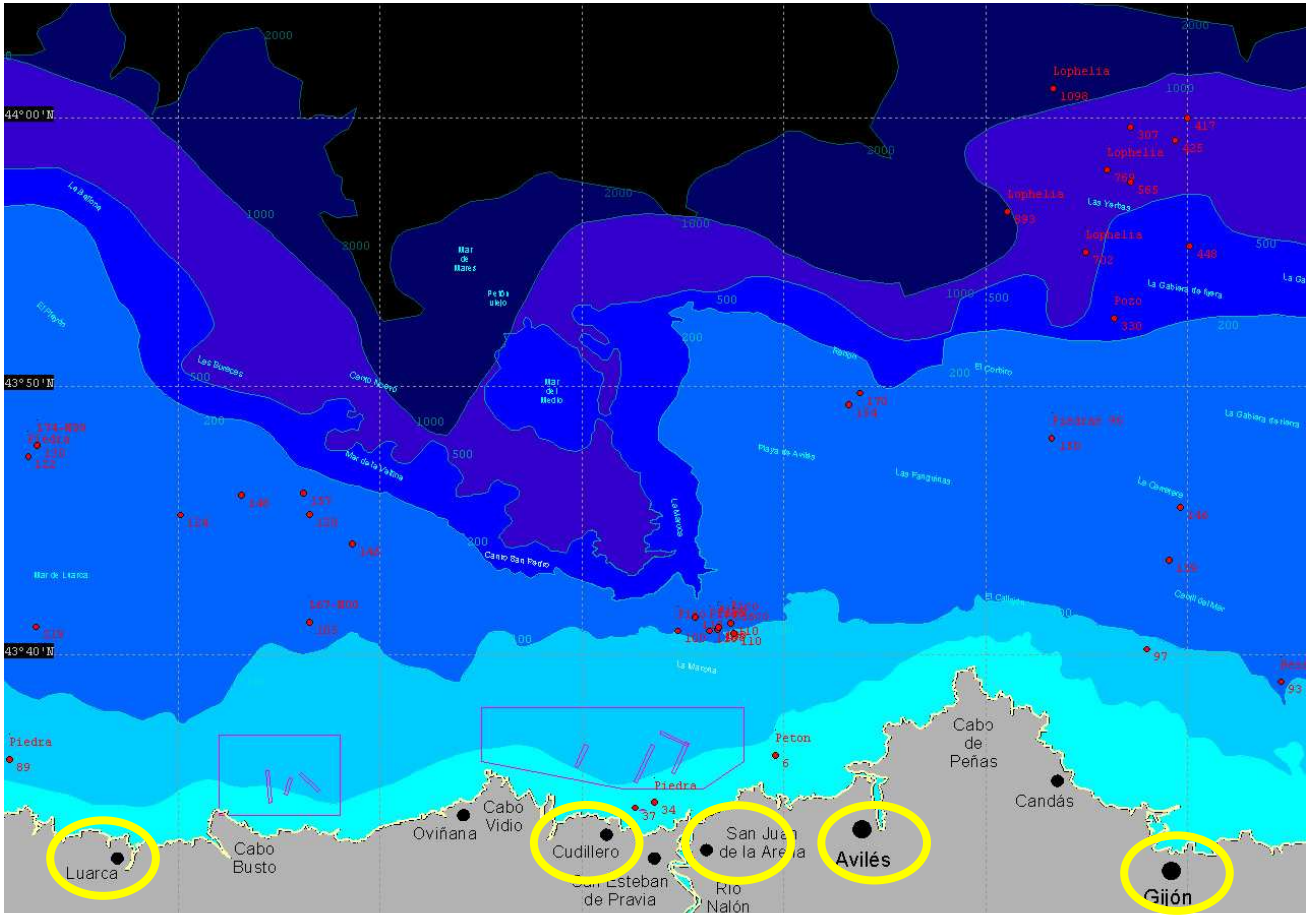
Previous informations

- very poor data on captures
- no geo referenciated information

- Around 250 fishing boats in the area of influence of the Avilés canyon

~ 225 artisanal

~ 25 trawlers



Current and future studies in Galicia Bank and Avilés canyon

Sampling in frame of INDEMARES (Vulnerable Ecosystems)

Photogrammetric sledge

Quantitative studies:

Community

population

distribution studies

ROV

Quantitative studies:

Community

population

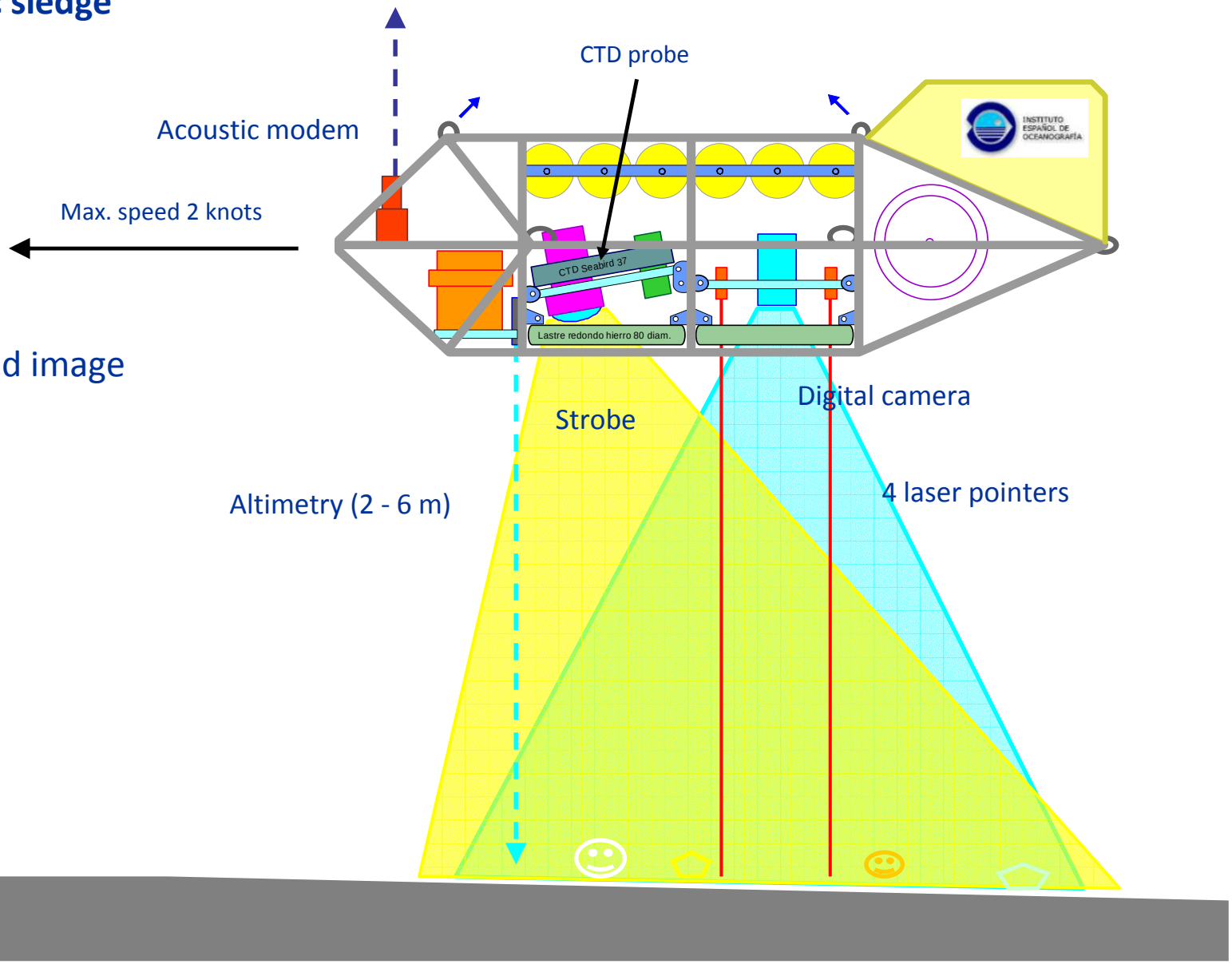
distribution studies

Demography

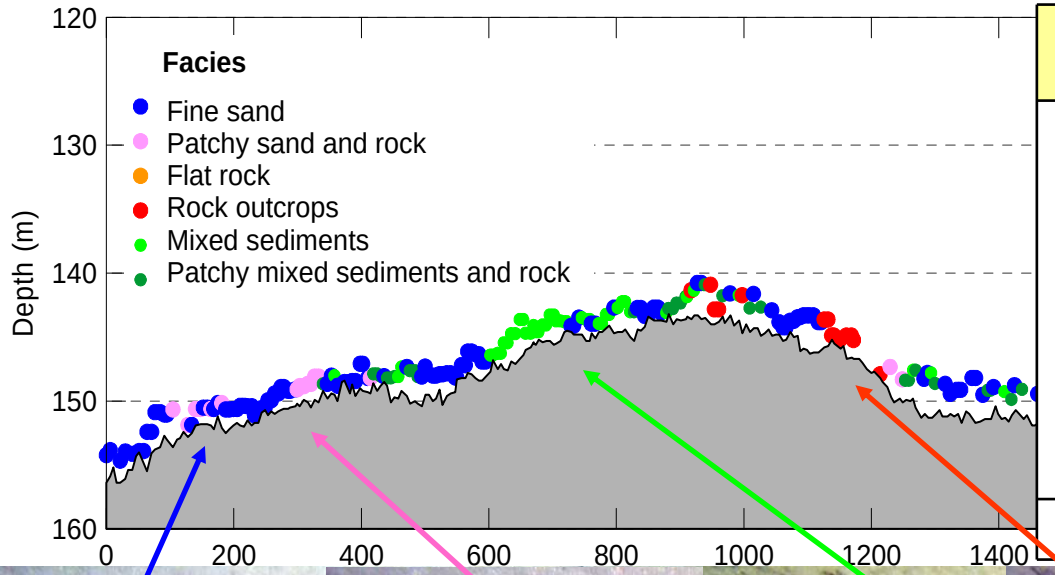
Current and future studies in Galicia Bank and Avilés canyon

Photogrammetric sledge

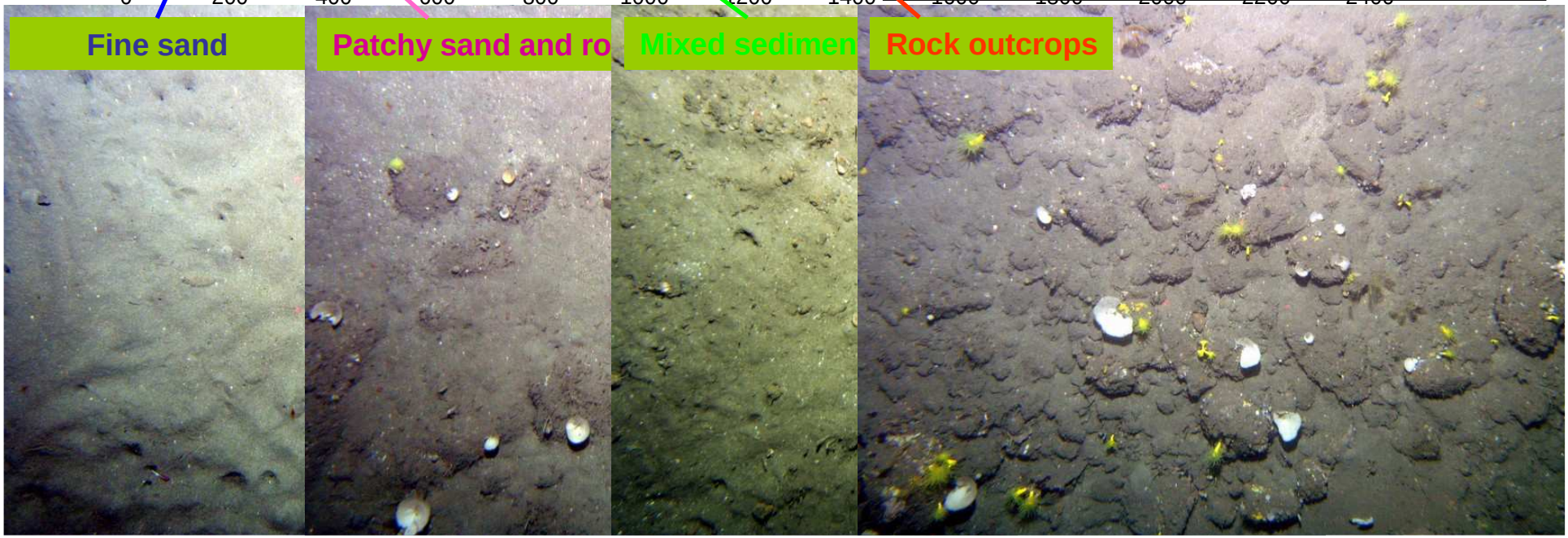
SEE POSTER!



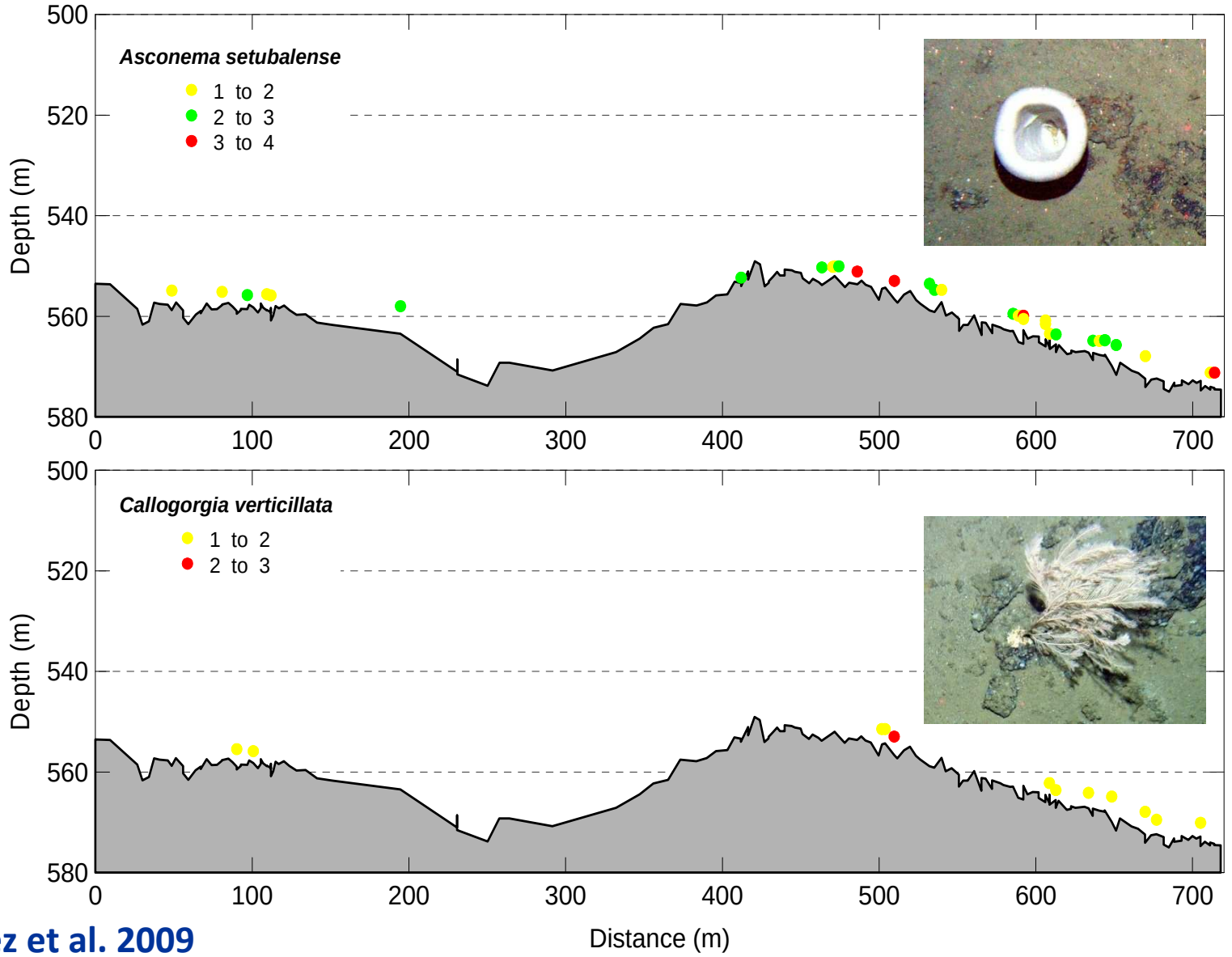
Future studies in Galicia Bank and Avilés canyon



Facies	Surface m²	%
Fine sand	**1314.1**	**56.81**
Patchy sand and rock	**171.2**	**7.40**
Flat rock	**37.9**	**1.64**
Rock outcrops	**126.7**	**5.48**
Mixed sediments	**395.2**	**17.09**
Patchy mixed sediments and rock	**268.0**	**11.59**
Total	**2313.1**	100.00



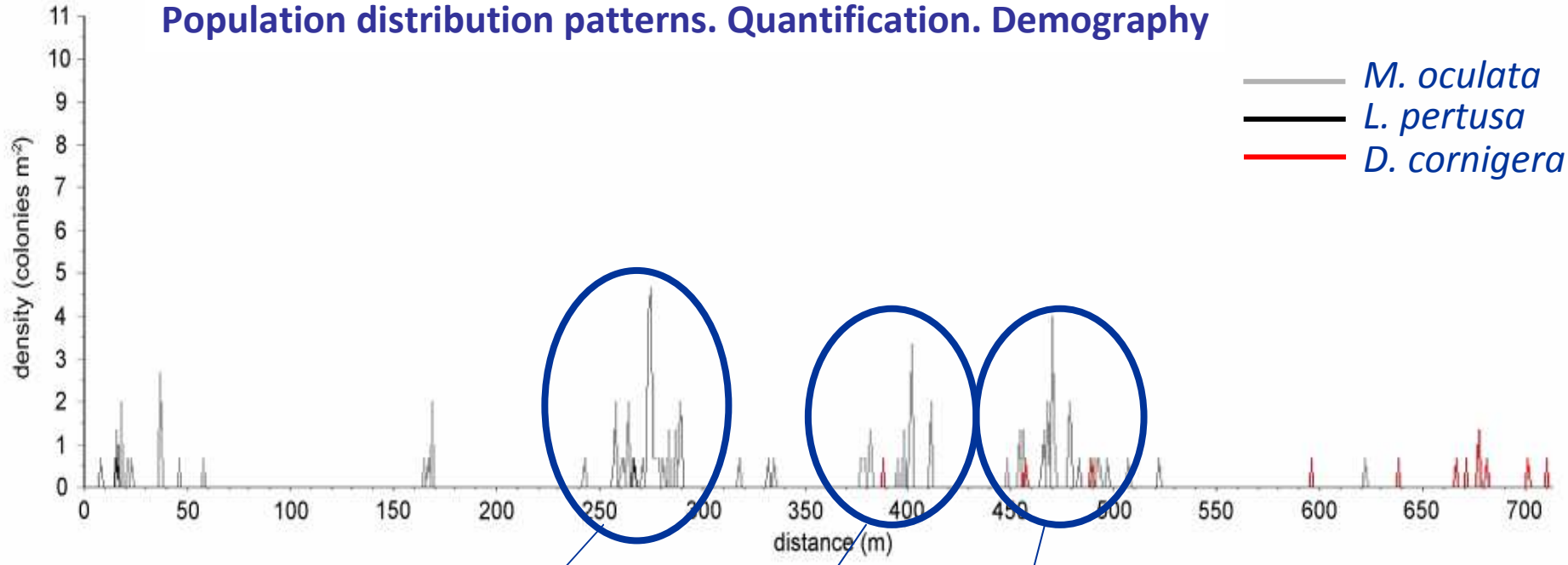
Future studies in Galicia Bank and Avilés canyon

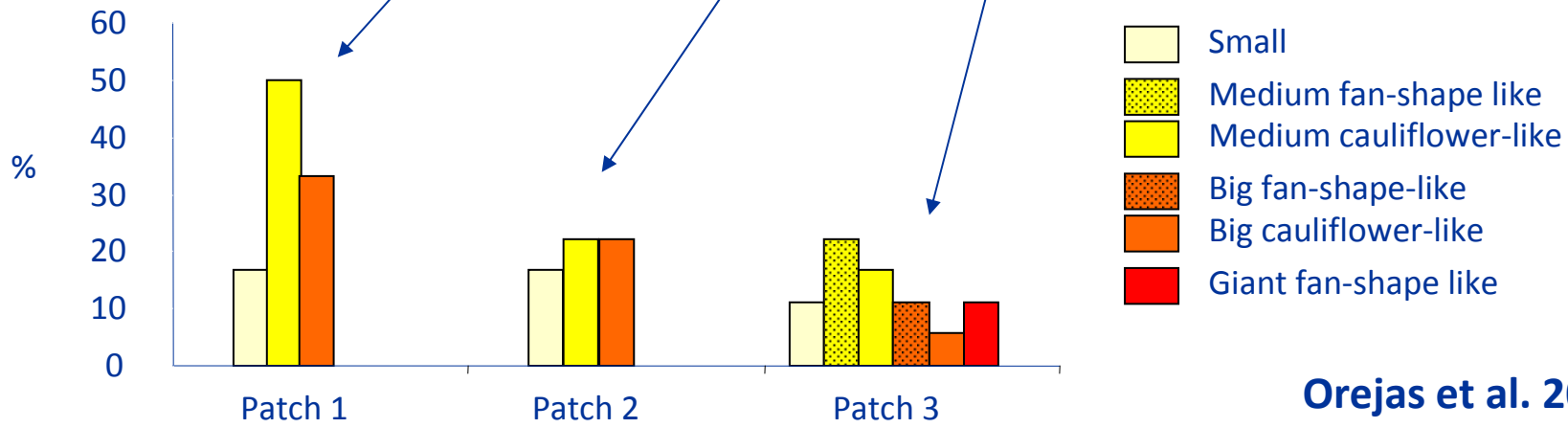


Sánchez et al. 2009

Future studies in Galicia Bank and Avilés canyon

Population distribution patterns. Quantification. Demography





Orejas et al. 2009

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